

REMARKS

Reconsideration of the application is respectfully requested for the following reasons:

1. Rejection of Claims 1-4 Under 35 USC §102(b) in view of U.S. Patent No. 6,147,460 (Ichihara)

This rejection is respectfully traversed on the grounds that the Ichihara patent fails to disclose or suggest a flash unit charging control circuit in which:

- a. supply of charging current from a power supply to a flash-unit capacitor is controlled by the output of a **square-wave oscillator**, as recited in claim 1;
- b. the square-wave oscillator **continuously** generates the square-wave signal that controls supply of charging current, with the control signal from the MCU merely connecting the output of the generator to the voltage conversion circuit, as also recited in claim 1; and
- c. the square-wave signal is supplied directly to the control electrode of a transistor in the voltage converter, as recited in claim 3; and
- d. the square-wave signal is supplied to the control electrode of a transistor connected on the primary winding side of the voltage converter transformer, as recited in new claim 8, without feedback from the secondary winding of the transformer.

While the charging circuit of Ichihara includes an “oscillation controlling” switching circuit 6, including a switching transistor 61, switching circuit 6 does not correspond to the claimed square-wave oscillator. Instead, the switching circuit 6 is a **self-excitation** circuit that **feeds back** the current in the **secondary winding of transformer 3** to **logic circuit 5**, which turns FET 4 on in response to the current feedback and a signal indicative of the voltage on the battery.

The result of the feedback-based control of Ichihara is a continuous signal that either supplies charging current to the battery or cuts off the charging current. This is not the same as the intermittent charging current supplied by transistor 531 in response to application of a square-wave signal from the square-wave oscillator 52. The oscillation controlling switching transistor 6 of Ichihara functions to control the current in response to current feedback and battery output voltage. **It does not output a square wave and does not correspond to the claimed square-wave oscillator.**

The claimed invention provides an oscillator that continuously oscillates, and that is connected to charging current supply transistor when a high signal is received from the MCU. This oscillator continuously generates the square wave, and is not dependent on feedback from the secondary winding of the transformer. Instead, once the claimed oscillator starts oscillating, it will output a square wave to turn transistor 531 ON and OFF until a charge stopping signal is received.

As a result, the claimed circuit is a simpler circuit than the circuit disclosed in the Ichihara patent, and operates in a different manner. It does not suffer from the disadvantages of the feedback circuit of Ichihara, which include the disadvantage that the conversion circuit 6 is subject to damage due to high voltage coming from the secondary winding, and the disadvantage of generating an unpleasant hum or noise resulting from the high voltage in the secondary winding.

The circuit of Ichihara requires feedback from the secondary winding of the transformer 3 in order generating an alternating current that can be applied to the primary winding through control of FET 4. The feedback from the secondary winding, which controls transistor 61, is then ANDed with the battery voltage feedback signal to obtain the ON/OFF activation signal for FET 4. As explained in col. 4, line 19, the charging circuit of Ichihara is a “*self-excited step-up circuit.*” In contrast, the claimed invention is an externally excited circuit.

In summary, although the output of logic circuit 5 of Ichihara is a series of high and low voltage levels, it is not a square-wave oscillator, and is not connected in the manner of the square-wave oscillator of the claimed invention. As a result, it is respectfully submitted that the circuit of Ichihara does not anticipate that of the claimed invention, and withdrawal of the rejection of claims 1-4 in view of the Ichihara patent is respectfully requested.

2. Rejection of Claims 5-7 Under 35 USC §103(a) in view of U.S. Patent Nos. 6,147,460 (Ichihara) and 6,104,144 (Yoneya)

This rejection is respectfully traversed on the grounds that the Yoneya patent, like the Ichihara patent fails to disclose or suggest a flash unit charging control circuit in which supply of charging current from a power supply to a flash-unit capacitor is controlled by the output of a **square-wave oscillator**, as recited in claim 1.

Furthermore, it is respectfully submitted that since the Ichihara patent already discloses a battery voltage feedback circuit, which is supplied to one of the inputs of logic circuit 5 (the other input being the feedback from the secondary winding), there is no reason to modify the circuit of Yoneya to include the voltage control of Yoneya. In fact, application of the circuit of Yoneya to the circuit of Ichihara would require substantial reconstruction of the circuit of Ichihara, and indeed change the basic principle of operation of the Ichihara circuit. As explained in MPEP 2143.02:

If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious (citing In re Ratti, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)...The court reversed the rejection holding the "suggested combination of references would require a substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate" 123 USPQ at 352. (See also, MPEP 2141.02, p. 2100-107 "A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention (emphasis in the original).

In the claimed invention, voltage feedback from the MCU is used to **modulate** or reduce the amplitude of the square wave applied to the transistor 531 by controlling current through a shunt resistor 543 via transistor 541. In contrast, the circuit of Yoneya directly shunts a portion of the charging current (which would be equivalent to providing a shunt around transistor 531 rather than voltage division of the applied square wave), while the circuit of Ichihara combines the voltage signal with a feedback signal from the secondary winding by means of logic circuit 5. Neither Ichihara nor Yoneya teaches shunting or voltage division of a square wave in the manner claimed, and the Yoneya circuit could not possibly be combined with the circuit of Ichihara without completely reconstructing the circuit of Ichihara (including elimination of the logic circuit 5, which would be rendered redundant by transistor Q1 and transistors R2 and R3 of Yoneya).

Because the Ichihara and Yoneya patents fail to disclose or suggest, whether considered individually or in any reasonable combination, all elements recited in the claims corresponding to original claims 5-7, withdrawal of the rejection under 35 USC §103(a) is respectfully requested.

Having thus overcome each of the rejections made in the Official Action, withdrawal of the rejections and expedited passage of the application to issue is requested.

Respectfully submitted,

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